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The Ontario Lake of the Woods Fisheries Atlas

1986

Ontario

Ministry of
Natural
Resources

Hon. Vincent G. Kerrio
Minister

Mary Mogford
Deputy Minister

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THE ONTARIO
LAKE OF THE WOODS
FISHERIES ATLAS

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SEPTEMBER 1986

ONTARIO MINISTRY OF NATURAL RESOURCES
KENORA, ONTARIO

PREFACE

It is the purpose of this Atlas to summarize current information on the status of the Lake of the Woods fishery in Ontario and related socio-economic data. This background information is necessary for the development of options and eventual long-term solutions to the management of Lake of the Woods. While this document concentrates on the Ontario fishery, it incorporates data on the Buffalo Bay (Manitoba) and Minnesota sectors of the lake which were previously published in the Minnesota-Ontario Boundary Waters Fisheries Atlas (1984).

The fishery resource of Lake of the Woods provides important economic and social benefits to Ontario. It is a major attraction for American tourists to Canada and supports the largest single non-resident sports fishery in the province (Bedi and Clifford 1980). Together, commercial and sports fishing on Lake of the Woods contribute directly to the local economy and the quality of life in this area. The primary goal in managing the Lake of the Woods fishery is to insure that these benefits can continue to be derived from this valuable resource.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

FIGURE PAGE

LIST OF FIGURES (continued)

LIST OF APPENDICES

APPENDIX PAGE

CURRENT STATUS OF FISH STOCKS

Introduction

The status of fish populations in Lake of the Woods was assessed by comparing estimates of the actual harvest to the theoretical potential yield by species and by sector.

The Ontario waters of Lake of the Woods have been arbitrarily divided into seven sectors for the purposes of study. These sectors form separate basins with distinct limnological, fish community and user group characteristics.

The potential yield by species and sector was based on the overall capability of a particular sector to produce a crop of fish, as indicated by a measure of its productivity, the morphoedaphic index (MEI) (Ryder 1965). The MEI is calculated using two factors: the mean depth of the water body and the total dissolved solids in the water. Shallow lakes have a greater potential fish production than deeper lakes, and lakes with high dissolved solids are more productive than those with low levels. In the case of Lake of the Woods, Whitefish Bay which is deeper and has a lower level of total dissolved solids is less productive than nearby Sabaskong Bay.

The potential yield by individual species represents a percentage of the total potential fish production of an area based on its MEI. These percentages for each species have been derived from their long-term percentage contribution in the total yield from a series of Ontario lakes that have withstood moderate to heavy fishing pressure overtime (SPOF Working Group No. 12, 1982). While this apportionment of the catch by species may vary

from lake to lake depending on the type of fish community and fishery (sport and for commercial) present, it has served as a guideline for estimating potential yields by species on Lake of the Woods. Yield estimates were further refined using data collected during regular fisheries assessment programs on Lake of the Woods. Monitoring programs involve a variety of standard analytical techniques which include index netting, commercial catch sampling, year class assessment, and creel surveys. These methods are useful in detecting trends in the fishery such as changes in the age and size structure of a population, in the mean age of fish caught and in growth rates. It has been shown that in heavily exploited populations, the mean age of fish caught declines, growth rates may increase, and the age/size structure shifts from a broad range of age/size classes to a narrow range dominated by younger and smaller fish (SPOF Working group No. 15, 1983)

Estimates of both actual harvest and potential yield by species were used to determine the target level harvest which reflects the actual status of the stock and insures maintenance of a healthy, harvestable population. Assessment has indicated that target harvests should be set at the potential yield level for most species in Lake of the Woods. It has also pointed to areas where the potential yield for a species has been exceeded and stocks are being overharvested, as well as areas where current harvest is below potential and greater fishing pressure could be sustained.

A. Sector 1 (North)

This sector which covers the northern end of Lake of the Woods has a surface area of 72,770 acres (29,450 ha), an estimated potential fish yield of 3.36 lbs/acre/yr (3.77 kg/ha/yr) and a total target harvest of 244,260 lbs/yr (111,027 kg/yr). It currently supports six commercial licences and an active sport fishery. This area experiences a high degree of use owing to its close proximity to the Kenora-Keewatin population centre and extensive cottage development on islands and surrounding shorelines.

Walleye:

The annual walleye harvest from this sector is estimated at about 34% above the recommended target (68,400 lbs/yr) for this species (SPOF #12, 1982). Although the establishment of commercial walleye quotas in 1978 has reduced annual harvest levels, stocks are still heavily exploited (Figures 1 and 2). Recent assessment of fish populations in this area has indicated that age and size class distributions for walleye remain limited to fish younger than age 10 (McIntyre 1979; Mosindy 1984). A decline in both commercial and angling catch per unit effort (CUE) has been observed over the most recent 25 year period, along with increases in growth and annual mortality rates for mature walleye.

Northern Pike:

Annual harvest estimates for northern pike from the North Sector (Figures 3 and 4) exceed the recommended target for this species (61,000 lbs/yr) by 30%. Although age class distributions of commercial, angling, and index net samples are restricted to fish younger than age 9, pike populations in this area appear to have remained stable at these exploitation levels over the last decade (Donetz 1982).

Lake Trout:

Lake trout are resident only in the area west and south-west of the Northern Peninsula, primarily Clearwater, Echo and Cul de Sac Bays. The potential yield for this species (12,200 lbs/yr) was based on the characteristic productivity of these waters (MEI = 3.8) which represent one third (24,460 acres or 9,900 ha) of the total surface area of the North Sector. Although lake trout are heavily fished by local anglers in this area (Alder 1979; Elliott 1982), current harvest estimates (7,000 lbs/yr) are well below the potential yield level. Indications of a stressed population and a failure to successfully reproduce in recent years are present. There exists a general absence of younger age classes in angling, index net and spawning population samples. Spawning grounds are limited and a loss of areas due to changes in the water quality and shoreline development is suspected.

Lake Whitefish:

Next to Shoal Lake, the North Sector has the largest amount of suitable whitefish habitat of any area. Populations would appear to be underproducing since current harvests (primarily commercial) which have remained stable at 14,000 lbs/yr (6,400 kg/yr) are well below the potential yield level of 24,425 lbs/yr (11,100 kg/yr) for this species. Whitefish stocks were reduced from former levels of abundance in this area by overfishing and the loss of traditional spawning areas through water level controls.

Other Species:

Smallmouth bass are present throughout this sector and are the most common species of bass although largemouth bass have been found in several areas during recent studies. Bass are a major component in the resident fish community

but they remain a secondary species in the angling and commercial (incidental catch) harvest (Figures 7 and 8). The incidence of larval parasites (*Clinostomum marginatum* and *Proteocephalus ambloplitis*) in the flesh affects their desirability as a food fish by the angling public.

Yellow perch, sauger and rock bass are common in the North Sector but they are under-utilized by both sport and commercial fisheries. A broad range of age and size classes are present for these species and their growth is comparable to that of lightly fished populations in nearby lakes.

Black crappie, muskellunge and brown bullhead are present in this sector. Their distribution is restricted to localized areas which provide suitable habitat. Current estimates indicate that the combined yield of these species forms a small part of total fish harvest from this sector.

B. Sector 2 (Central)

The Central Sector covers 99,520 acres (40,300 ha), has a potential fish yield of 3.82 lbs/acre/yr (4.24 kg/ha/yr) and a total target harvest of 376,200 lbs/yr (171,000 kg/yr). Fish populations are harvested by four commercial fishermen in the area, by non-resident anglers out of Sioux Narrows, Kenora and Northwest Angle in Minnesota, and by local resident anglers from the Kenora-Keewatin area.

Walleye:

Walleye stocks in this sector are currently harvested at about 38% above the recommended target of 105,300 lbs/yr or 47,900 kg/yr (Figures 1 and 2). Although a commercial quota for this sector of 53,000 lbs/yr (24,100 kg/yr) was introduced in 1978, population parameters continue to

indicate a stressed population. Walleye stocks exhibit a limited age class distribution with few age classes contributing to the fishery and a general absence of fish older than age 9. Observed rates of growth and maturity are faster than those for walleye in other nearby waters and are indicative of heavily fished populations in northern Ontario (SPOF #15, 1983). Catch per unit efforts (CUE) for both commercial and sport fisheries have declined over the last two decades. Both fisheries are dependent upon the recruitment of strong year classes which occur at irregular intervals but are essential in providing a surplus of individuals to maintain viability of the stocks.

Northern Pike:

Recent studies (McIntyre 1979; Donetz 1982) have indicated that pike populations in the Central Sector are also stressed. The target level of 75,200 lbs/yr (34,200 kg/yr) is currently exceeded by about 12% (Figures 3 and 4). Decreases in the mean age of the catch, rapid increases in growth rates, and a downward trend in commercial CUE have been noted for this species since 1973. Age class distributions of commercial, angling, and index net samples are restricted to fish younger than age 8.

Other Species:

Sauger (Figures 5 and 6) and yellow perch (Figures 9 and 10) together comprise about 20% of the biomass captured in index nets in this sector. They appear to be under-utilized by both commerical and sport fisheries. Both species exhibit broad age class distributions and their growth rates are comparable to those of lightly harvested populations in nearby lakes.

Both largemouth and smallmouth bass are found in the Central Sector although smallmouth are more widely distributed.The combined annual harvest of bass by the commercial (incidental catch) and sport fisheries is minimal (Figures 7 & 8). Ages up to 12 and 13 years are well represented in index netting and angling catch samples.

Whitefish in this sector are restricted to areas which provide refuge from higher summer water temperatures. They have been heavily fished in the past. Whitefish from nearby Whitefish Bay move into the eastern portion of the Central Sector and are caught by commercial fishing during fall and winter. The extent and regularity of these movements are not known.

Our knowledge concerning the population dynamics of black crappie and muskellunge in this sector is limited. Both species are not widely distributed but occur in localized areas which provide suitable habitat.

C. Sector 3 (Whitefish Bay)

Sector 3 covers 50,900 acres (20,600 ha) and is the least productive of all parts of Lake of the Woods owing to its oligotrophic nature. It has a total target harvest of 127,800 lbs/yr (58,092 kg/yr) and a potential yield of 2.51 lbs/acre/yr (2.82 kg/ha/yr). Although commercial fishing is restricted from this area, it is intensely fished by anglers, primarily non-resident guests of the numerous tourist resorts in the Sioux Narrows-Nestor Falls area.

Walleye:

The annual walleye harvest exceeds the potential yield (25,520 lbs/yr) for this species by 40% (Figures 1 and 2). Walleye are widely distributed, but they are found in greatest numbers in the shallower, more productive waters of Snake, Knickerbocker and the southern portion of Whitefish Bay. Walleye populations appear to be stable, as indicated by a fairly broad distribution of age and size classes, average rates of growth and maturity, and a relatively constant angling CUE over the last two decades (Macins 1966; Walker et al 1982). Therefore, it would appear that this stock is capable of sustaining a higher target harvest than that suggested by the estimated potential yield for this species.

Northern Pike:

Northern pike are presently harvested at about 38% over the recommended target of 29,480 lbs/yr (13,400 kg/yr). This species is heavily exploited but it would appear to be holding its own at current levels of fishing pressure (Donetz 1982). A broad range of age and size classes are present in the fishery. Rates of growth and maturity, in addition to the angling CUE, have remained stable since the mid 1960's (Macins 1966; Foote et al 1981; Walker et al 1982). This stock may also be capable of sustaining a higher target harvest than that based on the potential yield estimate.

Lake Trout:

Current estimates place the annual lake trout harvest from the area at 12,320 lbs/yr (5,600 kg/yr) which is below the potential yield of 20,450 lbs/yr (9,300 kg/yr) for this species. Lake trout are intensely fished by both the winter (Elliot 1982) and open water sport fisheries (Alder 1979).

Although a broad range of age and size classes are present in catch samples, over 50% of the fish kept are immature (Elliot 1982; Mosindy 1984). The angling CUE and the mean size of trout in the catch and in spawning populations have steadily decreased since the mid 1960's (Macins 1966; Elliot 1982). Growth rates are considerably greater than the provincial average (SPOF # 15, 1983). Data would indicate that trout populations are presently stressed from overharvest in this area. A target harvest at a level well below the potential yield estimate may be required to allow this population to rebuild.

Other Species:

Bass, especially smallmouth, are widely distributed throughout Whitefish Bay. Although they form a significant portion of the fish biomass, present harvests are 50% below the recommended target of 21,700 lbs/yr (9,900 kg/yr), (Figures 7 and 8). Populations appear to be stable with a broad range of age and size classes present.

Lake whitefish are also an important component of the fish community although their abundance has been considerably reduced by past overfishing (Macins, pers. comm.). Current harvest by the sport fishery in Whitefish Bay is minimal.

Yellow perch and sauger are present in littoral habitats throughout Whitefish Bay. Sauger are not common since high water transparencies are not optimal for this species. Together yellow perch and sauger comprise less than 2% of the total fish harvest from this sector (Mosindy 1984).

Black crappie and muskellunge are limited to small areas of favourable habitat within Whitefish Bay. At present, annual harvests lie within target levels.

D. Sector 4 (Sabaskong Bay)

This sector which includes Obabikon Lake, Sabaskong, Burrow and Obabikon Bays, has a surface area of 44,970 acres (18,200 ha), a potential fish yield of 4.38 lbs/acre/yr (4.92 kg/ha/yr) and a total target harvest of 197,120 lbs/yr (89,600 kg/yr). These waters are among the most productive on Lake of the Woods. This sector experiences the heaviest sport fishing pressure by area on the lake. The majority of anglers are non-resident guests of nearby tourist resorts in Morson, Hanson Bay and Nestor Falls. Commercial fishing is not permitted in this area.

Walleye:

Current annual walleye harvests from Sector 4 (Figures 1 and 2) exceed the recommended target (63,100 lbs/yr) by 50%. Population parameters indicate that walleye are heavily exploited in this area. Stocks exhibit a limited age class distribution with a general absence of fish older than age 9 and a few age classes contributing to the angling fishery (Foote et al 1981; Walker et al 1982; Mosindy 1984). Both growth and maturity rates are faster than those for walleye in nearby waters of Lake of the Woods. The angling CUE for this species has shown a gradual decline during the period from 1965 to 1983 (Macins 1966; Mosindy 1984). Despite intense angling pressure, strong year classes continue to be recruited, largely through the presence of excellent spawning and nursery habitat in this area.

Northern Pike:

Northern pike are presently harvested at 15% above the recommended target (49,300 lbs/yr). Populations appear to be stable at current harvest levels. The more rapid growth and maturity rates of pike in this area have been attributed to differences in feeding behaviour and warmer water

temperatures than in nearby sectors (Foote et al 1981; Walker et al 1982). The mean ages of pike in both index net and angling catches have increased and the angling CUE has not changed appreciably over the long term (Macins 1966; Donetz 1982).

Other Species:

Both smallmouth and largemouth bass are found in this sector but the former is more widely distributed. The total annual bass harvest (Figures 7 and 8) is well below the recommended target level of 27,600 lbs/yr (12,500 kg/yr).

Sauger and yellow perch together account for about 20% of the available fish biomass in this sector. Both species are lightly exploited by the angling fishery (Figures 5, 6, 9 and 10), as evidenced by broad distributions of age/size classes and growth rates which are comparable to those of populations in less heavily fished areas.

Both muskellunge and black crappie are more common throughout this sector than in other parts of the lake. Our present knowledge concerning the life history and population dynamics of these species is limited. Recent fluctuations in crappie abundance have paralleled an increase in pressure from commercial and angling fisheries. Past catches, primarily from an expanded commercial fishery, exceeded the target level by up to 100%. Commercial fishing is no longer allowed in this area.

E. Sector 5 and 6 (South)

Together, the South Sectors encompass the majority of Ontario waters south of the Aulneau Peninsula and cover 281,000 acres (113,800 ha.) The potential yield is 3.71 lbs/acre/yr (4.16 kg/ha/yr) and the total target harvest is 1,040,600 lbs/yr

(473,000 kg/yr). A total of 35 commercial licenses are held on 25 fishing lots spread throughout this area. These sectors are fished by anglers from the Rainy River area and the Northwest Angle in Minnesota and by non-resident and local anglers through Morson and Nestor Falls.

Walleye:

Walleye stocks in these sectors have not been fished to the same extent as those in other Ontario portions of Lake of the Woods, but annual harvests have closely approached or exceeded the target level of 291,400 lbs/yr (132,455 kg/yr) for this species in past years (Figures 1 and 2). Recent assessment of the fishery (Mosindy 1983) suggests that walleye populations are intensively harvested as evidenced by limited age class distributions (a general absence of walleye older than age 9), relatively fast growth rates, and early maturities. Both sport and commercial fisheries are dependent on the recruitment of strong year classes which appear at irregular intervals. Angling CUE for walleye declined from 0.66 fish or 0.78 lbs per man-hour in 1965 to 0.45 fish or 0.41 lbs per man-hour in 1983. This has occurred despite declining commercial effort.

Northern Pike:

Habitat favourable for pike is not consistent throughout these sectors since the majority of water areas are open and exposed. Recent estimates indicate that pike are being harvested at about 17% over the recommended target level (Figures 3 and 4). Commercial fishing pressure on this species has fluctuated in the past, due primarily to market conditions, but has increased since quotas were placed on walleye in 1978. There has also been a trend to increased pike harvest by anglers in this area of the lake (Mosindy 1984). Pike comprised 15% of the total angling harvest from these sectors in 1983 compared to less than 10% in 1977.

Recent assessment of the fishery showed a limited age class distribution for this species in commercial, sport, and index net samples with few individuals older than 8 years present. Growth and maturity rates were similar to those of heavily exploited northern Ontario populations (SPOF #15, 1983).

Other Species:

Sauger comprise about 15% of the available fish biomass but they are under-utilized by both the commercial and sport fisheries, due largely to their average size which is smaller than that of the preferred walleye (Figures 5 and 6). Fish sampled during recent assessments showed a wide distribution of age classes up to 14 years. Growth and maturity rates were comparable to those of less exploited populations.

Yellow perch are a major component of the fish community in the South Sectors, comprising 16.5% of the total catch by weight in index nets (Figures 9 and 10). The annual harvest of this species is minimal since its desirability as a food species is considerably reduced by the high incidence of yellow grub (Clinostomum marginatum) in the flesh.

Smallmouth bass also appear to be under-utilized. The open and exposed character of these sectors does not favor this species (Figures 7 and 8). A broad distribution of age classes was evident in samples of fish taken from index net and angling catches (Mosindy 1983).

The distribution of black crappie and muskellunge in the South Sectors are limited to small pockets offering suitable habitat in Obabikon, Miles, Monument and Sabaskosing Bays. Combined commercial and sport harvests of crappie have

averaged 15,000 lbs/yr for the period 1964-83. Analysis of past catch data has revealed wide fluctuation in annual harvests of this species which might indicate the "fishing up" of local populations or a natural cyclical pattern of population abundance.

Lake sturgeon have never recovered from intense overexploitation at the turn of the last century. With recent improvements in the water quality and spawning habitat in major tributaties, especially the Rainy River, an increased recruitment of young sturgeon in commercial nets (4 1/4" mesh) has been reported in the South Sectors. It is not known what effect this will have on the future fishery, but commercial catches are being held at about 10,000 lbs/yr which is the average reported catch for the most recent 5 year period.

F. Sector 7 (Shoal Lake)

This sector which encompasses all of Shoal Lake is considered to be part of Lake of the Woods for management purposes. It covers 64,000 acres (25,900 ha) and has a potential fish yield of 3.79 lbs/acre/yr (4.26 kg/ha/yr). In the past Shoal Lake was intensely fished by five commercial operations and a sport fishery composed of non-resident cottagers, non-resident guests at nearby resorts, and local residents of the Kenora-Keewatin area. Fish populations, especially walleye, were overexploited to the point of collapse. This prompted the closure of the walleye fishery and restrictions being placed on the use of gill nets. Since these measures were imposed in May 1983, both commercial and sport fishing activity on this lake have been minimal.

Walleye:

This sector is one of the most productive for walleye, as evidenced by the extent of past over-harvests. Between 1960 and 1983, commercial catches alone exceeded the species potential yield of 72,800 lbs/yr (33,100 kg/yr) in 17 of 24 years and by up to 650% in a single year (1977). Sport harvests were estimated at about 40,000 lbs/yr (18,200 kg/yr) during this period (McDonald 1971; Alder 1979). By 1982, numbers of mature fish had been greatly reduced and walleye stocks were primarily composed of a single (1979) year class (Roos et al 1983). In an effort to protect these last potential spawners, both the commercial and sport fisheries for walleye were closed in May, 1983. With restrictions on the fishery in place and improvements made to major spawning grounds at the mouth of the Falcon River, a gradual return of walleye stocks to former levels of abundance is anticipated.

Northern Pike:

Northern pike have also been stressed by past overfishing in this area. Current harvests are well below the potential yield of 60,685 lbs/yr (27,585 kg/yr). Age class distributions from index and commercial catch samples are restricted to fish younger than age 8. Both growth and maturity rates for northern pike have increased dramatically during the last decade and are more rapid than those from any other part of Lake of the Woods (Roos et al 1983).

Lake Whitefish:

Although Shoal Lake has the largest amount of suitable habitat for this species, annual harvests have dropped to well below the potential yield of 43,690 lbs/yr (19,860 kg/yr) during the last decade. Populations would appear to be underproducing as the result of past overfishing. The

recent reduction in commercial fishing effort on Shoal Lake will hopefully improve the status of these stocks.

Other Species:

Smallmouth are the only species of bass presently found in this sector. They are an important but under-utilized component of the fish community. Since the closure of the walleye fishery, more interest has been directed towards this species by anglers, but harvests are still well below the species potential yield of 41,265 lbs/yr (18,760 kg/yr).

Sauger are not found in Shoal Lake but yellow perch are abundant. Owing to the high incidence of yellow grub in their flesh, perch remain a secondary species in the angling and commercial catch.

As in other parts of Lake of the Woods, both muskellunge and black crappies have a localized distribution. Estimates of their current harvest lie within target levels for this sector.

LAKE OF THE WOODS

ANNUAL HARVEST, TARGET LEVEL, AND POTENTIAL YIELD FOR WALLEYE

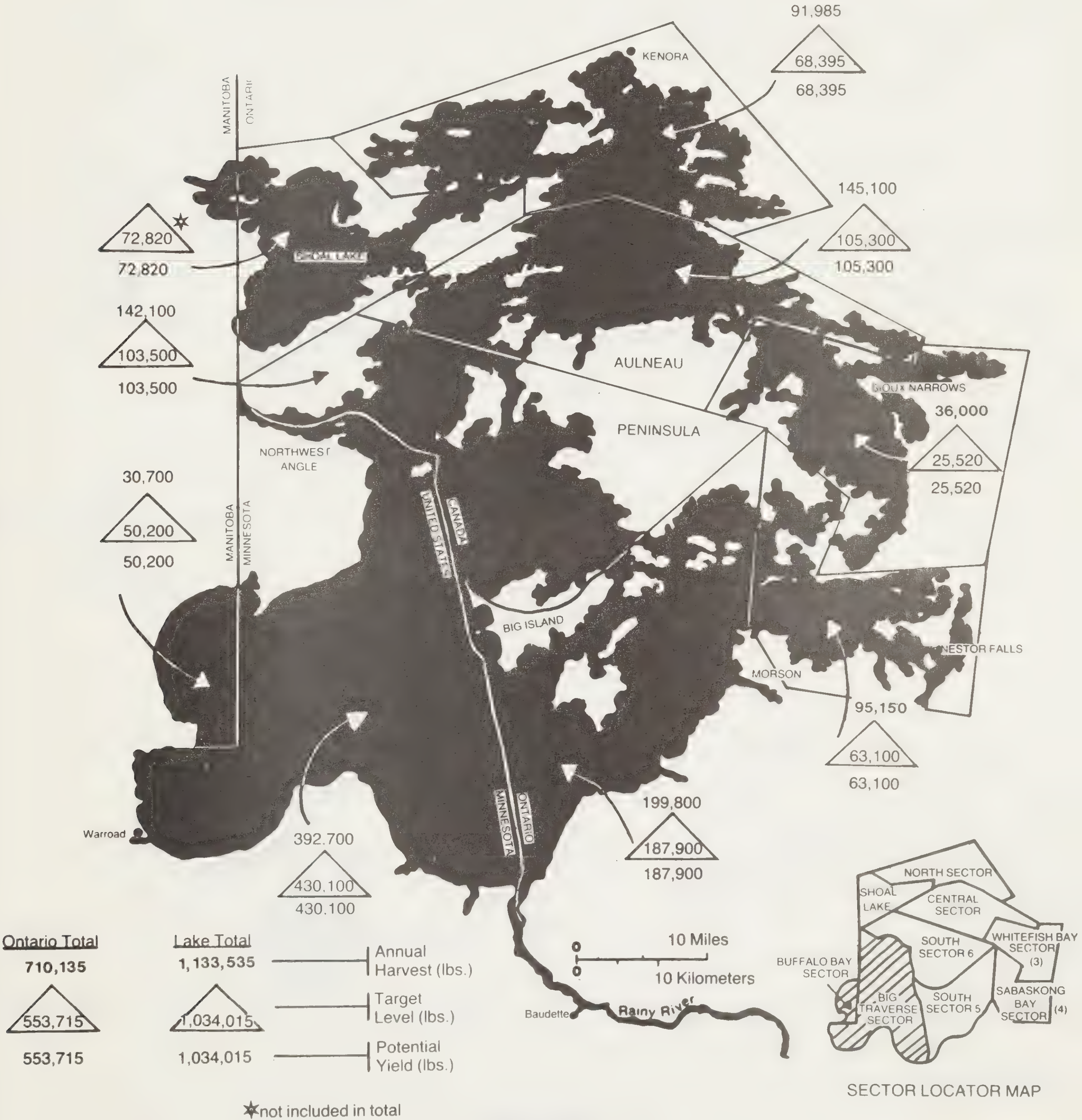


FIGURE 1

LAKE OF THE WOODS
WALLEYE HARVEST
BY USER GROUP

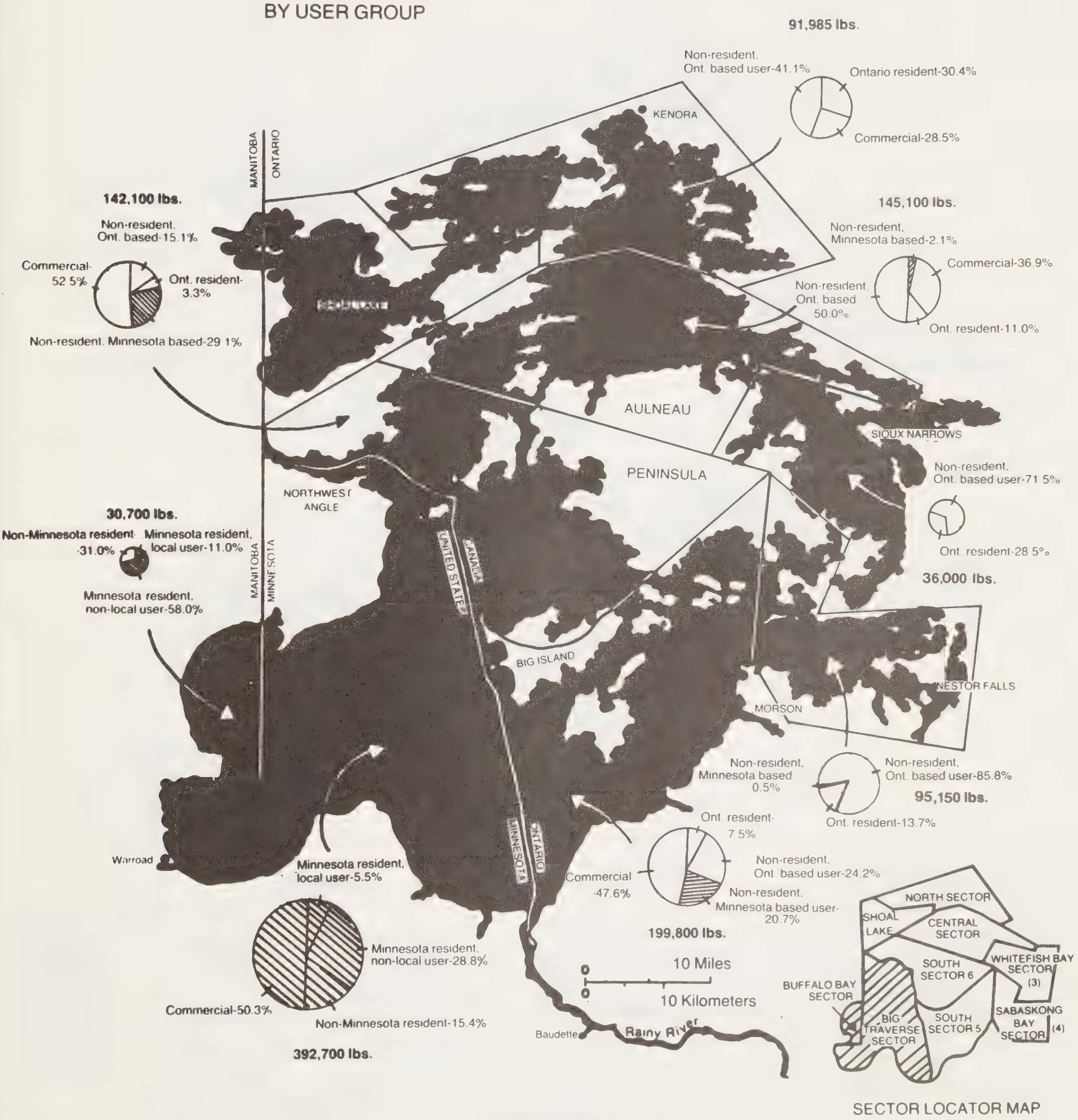
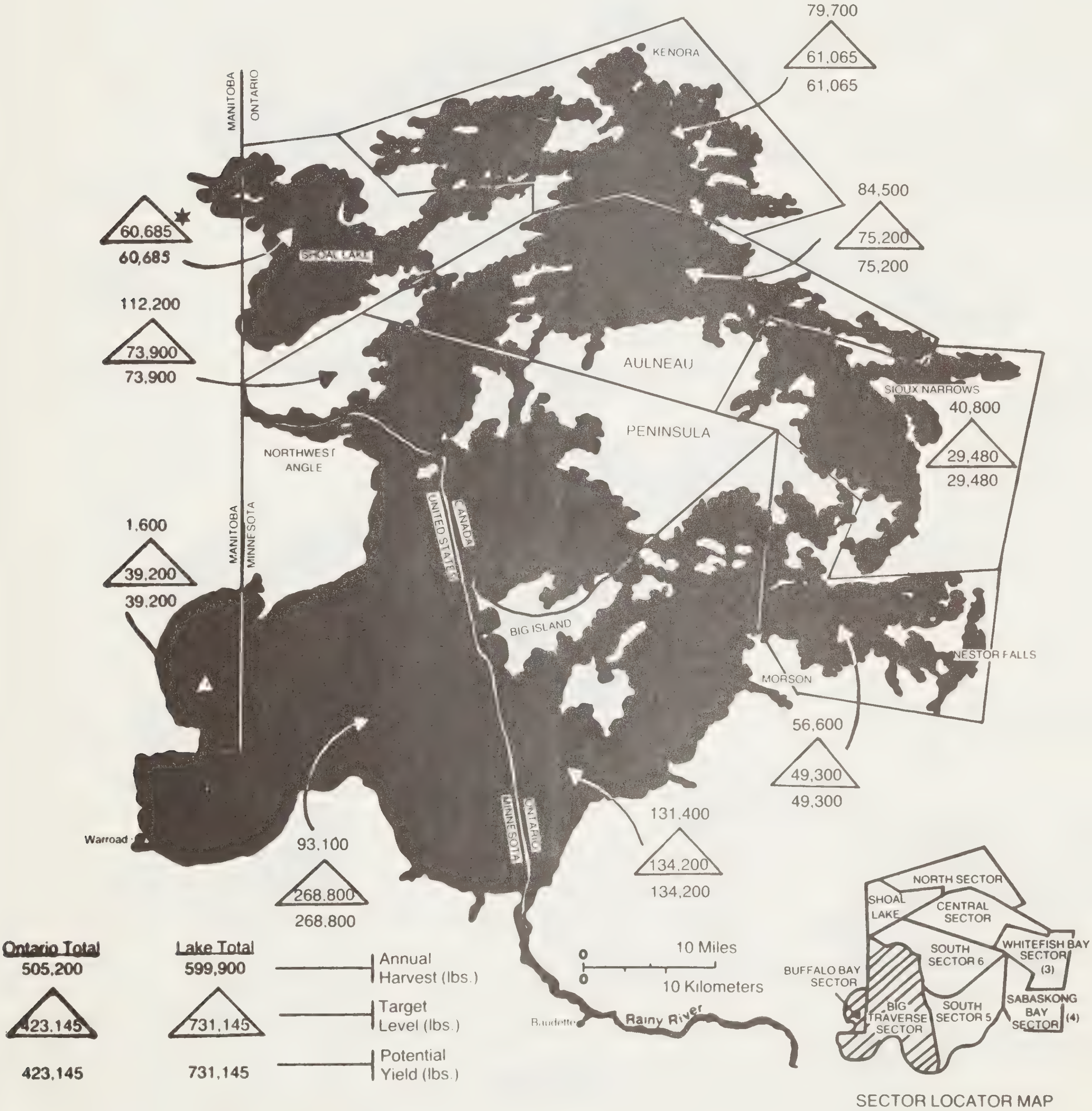


FIGURE 2

LAKE OF THE WOODS

ANNUAL HARVEST, TARGET LEVEL HARVEST, AND POTENTIAL YIELD FOR NORTHERN PIKE



*not included in totals

FIGURE 3

LAKE OF THE WOODS
NORTHERN PIKE HARVEST
BY USER GROUP

FIGURE 4

LAKE OF THE WOODS

ANNUAL HARVEST, TARGET LEVEL HARVEST, AND POTENTIAL YIELD FOR SAUGER

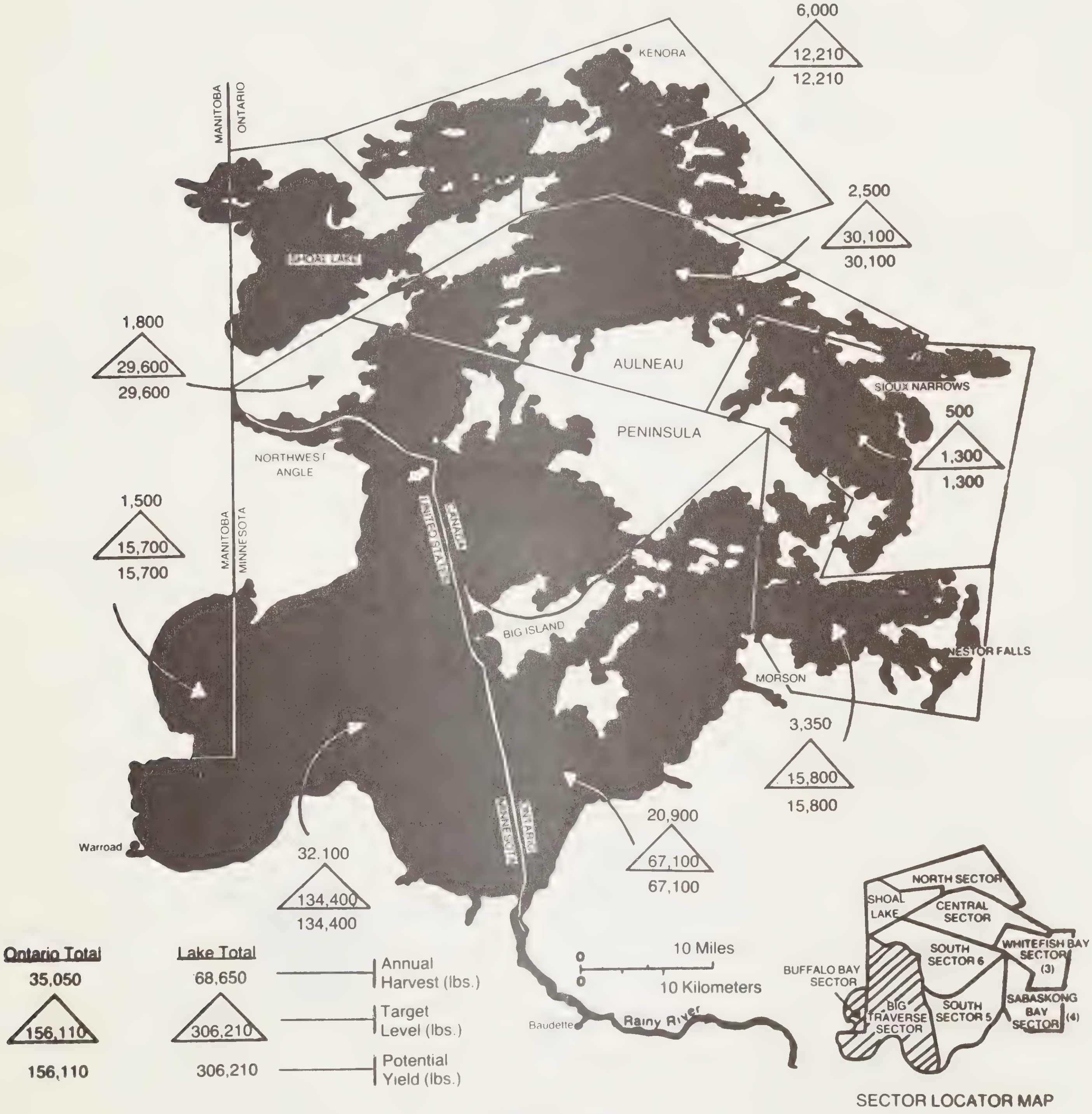


FIGURE 5

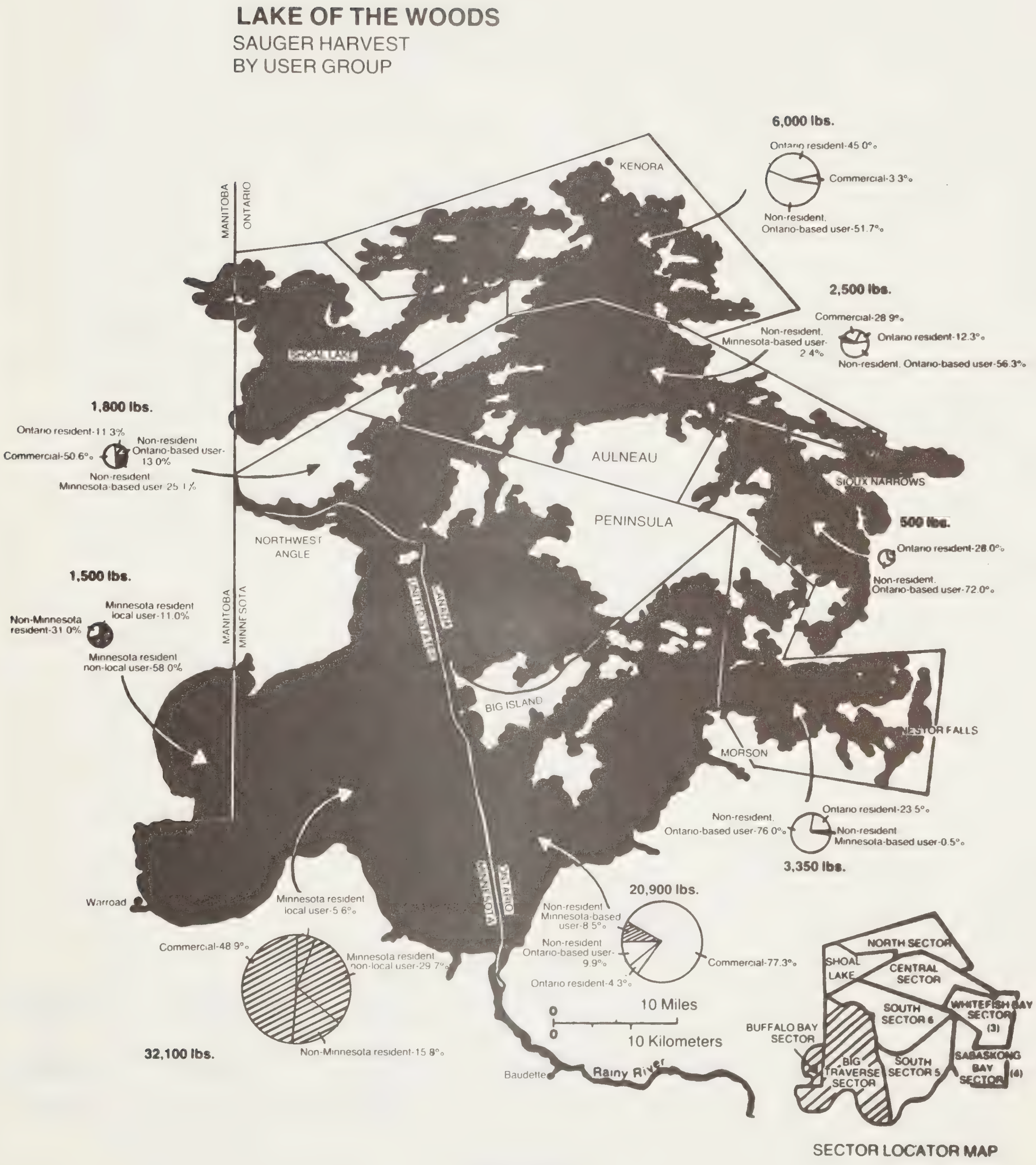

LAKE OF THE WOODS
SAUGER HARVEST
BY USER GROUP
6,000 lbs.
Ontario resident-45.0%
Commercial-3.3%
Non-resident, Ontario-based user-51.7%
KENORA
MANITOBA
ONTARIO
2,500 lbs.
Commercial-28.9%
Ontario resident-12.3%
Non-resident, Minnesota-based user-2.4%
Non-resident, Ontario-based user-56.3%
SHOAL LAKE
1,800 lbs.
Ontario resident-11.3%
Commercial-50.6%
Non-resident Ontario-based user-13.0%
Non-resident Minnesota-based user 25.1%
AULNEAU
PENINSULA
SIOUX NARROWS
500 lbs.
Ontario resident-28.0%
Non-resident, Ontario-based user-72.0%
NORTHWEST ANGLE
1,500 lbs.
Minnesota resident local user-11.0%
Non-Minnesota resident-31.0%
Minnesota resident non-local user-58.0%
MANITOBA
MINNESOTA
CANADA
UNITED STATES
BIG ISLAND
NESTOR FALLS
MORSON
Ontario resident-23.5%
Non-resident, Ontario-based user-76.0%
Non-resident Minnesota-based user-0.5%
3,350 lbs.
Warroad
Minnesota resident local user-5.6%
Commercial-48.9%
Minnesota resident non-local user-29.7%
Non-Minnesota resident-15.8%
32,100 lbs.
ONTARIO
MINNESOTA
20,900 lbs.
Non-resident Minnesota-based user-8.5%
Non-resident Ontario-based user-9.9%
Ontario resident-4.3%
Commercial-77.3%
0
10 Miles
0
10 Kilometers
Baudette
Rainy River
NORTH SECTOR
SHOAL LAKE
CENTRAL SECTOR
SOUTH SECTOR 6
WHITEFISH BAY SECTOR (3)
BUFFALO BAY SECTOR
BIG TRAVERSE SECTOR
SOUTH SECTOR 5
SABASKONG BAY SECTOR (4)
SECTOR LOCATOR MAP

FIGURE 6

LAKE OF THE WOODS

ANNUAL HARVEST, TARGET LEVEL HARVEST, AND POTENTIAL YIELD FOR SMALLMOUTH BASS

FIGURE 7

LAKE OF THE WOODS
SMALLMOUTH BASS HARVEST
BY USER GROUP

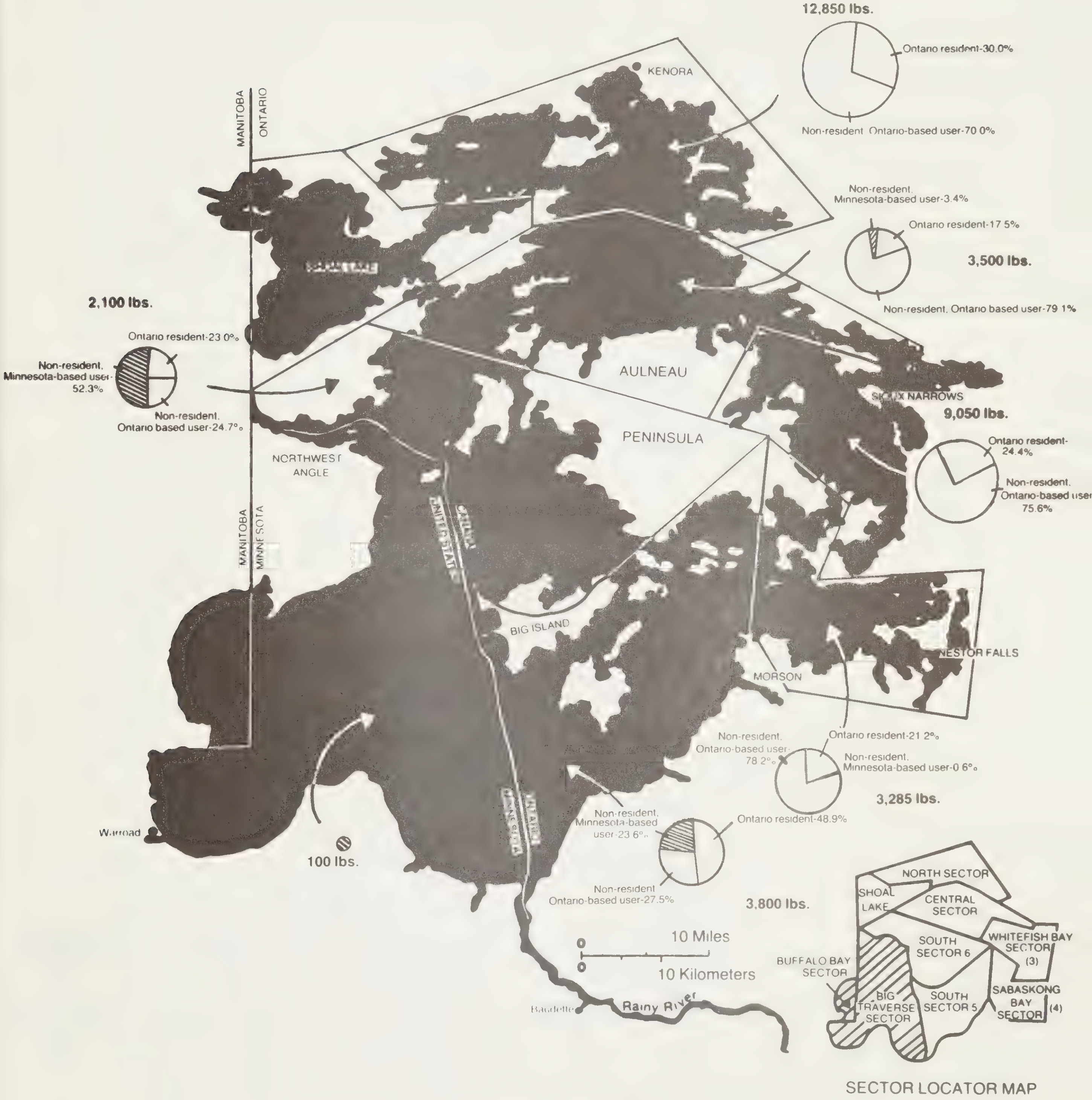


FIGURE 8

LAKE OF THE WOODS
ANNUAL HARVEST, TARGET LEVEL HARVEST, AND POTENTIAL YIELD FOR YELLOW PERCH

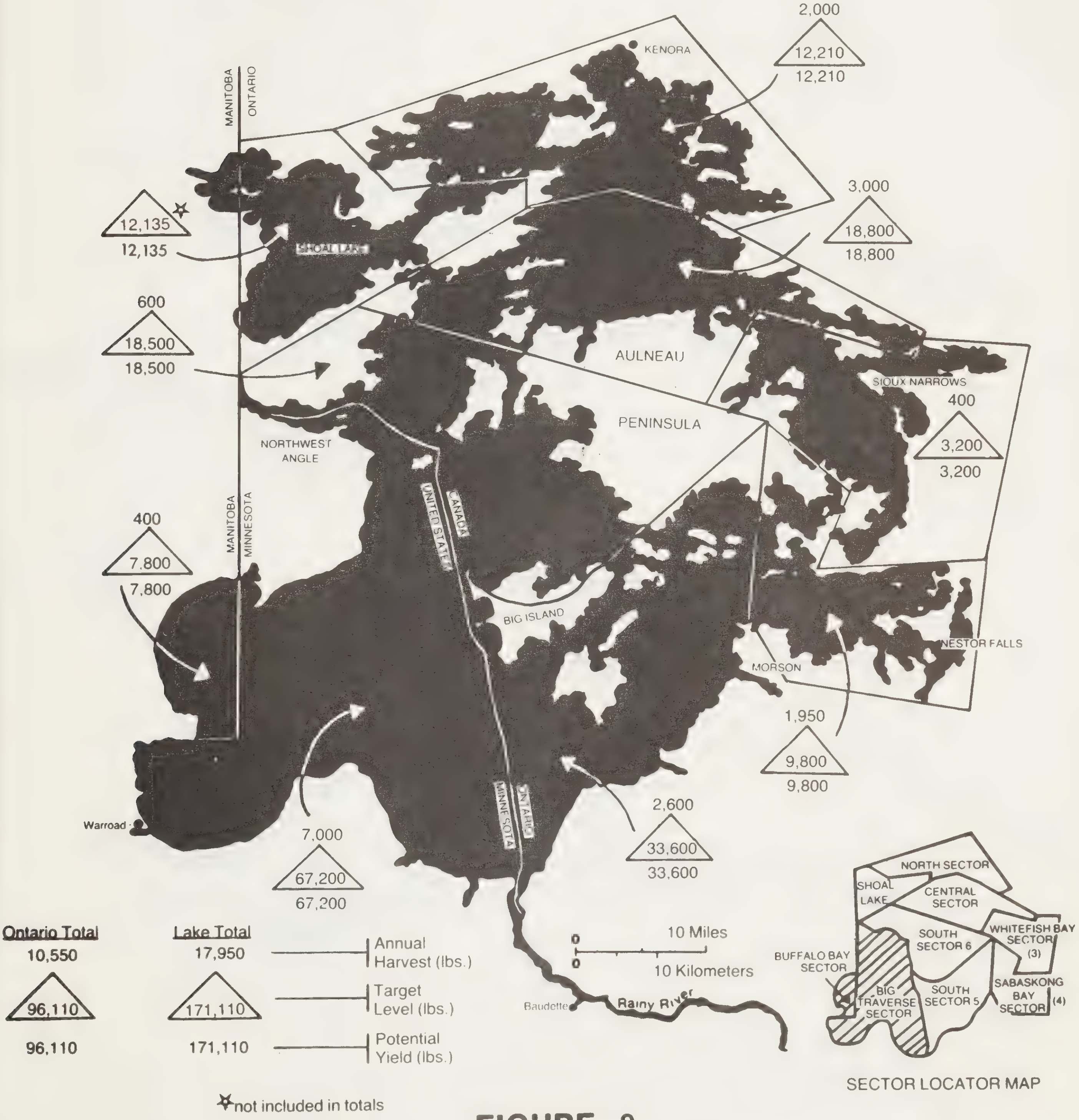


FIGURE 9

LAKE OF THE WOODS
YELLOW PERCH HARVEST
BY USER GROUP

FIGURE 10

A Socio-Economic Evaluation *

A. Socio-Economic Infrastructure

1. History of Use

Use of the Lake of the Woods fishery for domestic consumption by local Indian people dates back thousands of years. All other users of the fishery have developed within the last century. The recreational fishery has become known internationally within the last 50 years.

2. Local Communities and Population

Three-fourths of a total local population of 28,000 people, who live around Lake of the Woods proper, reside in Ontario. Most have varying degrees of interest in or dependence on the fishery. Seventy-three percent of the Ontario population live in the Kenora, Keewatin and Jaffray-Melick area, 12 percent in other organized areas, 9 percent in unorganized areas and 6 percent on Indian Reserves. The population has been relatively stable over the past few years and no immediate prospects for major changes in present population patterns are anticipated.

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* Information presented in this section has been taken directly from the Minnesota - Ontario Boundary Waters Fisheries Atlas (1984) and Lake of the Woods Fisheries: A Social and Economic Analysis (1982).

Table 1. Ontario population in Lake of the Woods area.

Organized Municipalities (1976 Census)	Population	
Kenora, Keewatin, Jaffray & Melick	16,000	
Sioux Narrows	412	
Nestor Falls	200	
Morson	350	
Rainy River	1,200	
Atwood Twp.	315	
McCrosson and Tovell Twp.	250	
Sub Total	18,727	
Indian Reserves (1978 Census)		
Big Grassy	162	
Big Island	63	
Northwest Angle 33	131	
Northwest Angle 37	63	
Rat Portage	183	
Sabaskong	234	
Washagamis Bay	78	
Whitefish Bay	400	
Sub Total	1,314	
Unorganized Areas (1976 Census) (approx.)	1,800	
Total (Ontario)		21,841

3. Economy

The economy of the Lake of the Woods area is heavily oriented to timber, tourism, fishing, transportation, and public and commercial services. The only major industrial employers are Boise Cascade, Canadian Pacific Railway (Kenora), Canadian National Railway (Rainy River).

A Socio-Economic Evaluation *

A. Socio-Economic Infrastructure

1. History of Use

Use of the Lake of the Woods fishery for domestic consumption by local Indian people dates back thousands of years. All other users of the fishery have developed within the last century. The recreational fishery has become known internationally within the last 50 years.

2. Local Communities and Population

Three-fourths of a total local population of 28,000 people, who live around Lake of the Woods proper, reside in Ontario. Most have varying degrees of interest in or dependence on the fishery. Seventy-three percent of the Ontario population live in the Kenora, Keewatin and Jaffray-Melick area, 12 percent in other organized areas, 9 percent in unorganized areas and 6 percent on Indian Reserves. The population has been relatively stable over the past few years and no immediate prospects for major changes in present population patterns are anticipated.

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* Information presented in this section has been taken directly from the Minnesota - Ontario Boundary Waters Fisheries Atlas (1984) and Lake of the Woods Fisheries: A Social and Economic Analysis (1982).

Together, commercial and sports fishing on Lake of the Woods make an important contribution to a local economy which is not growing significantly but offers a limited range of employment opportunities to local residents. The contribution of the fishery is of particular economic and social significance to the people who live outside the Kenora area and the town of Rainy River in Ontario. In the small communities and on the Indian reserves, employment and income opportunities other than those based on the lake's fishery are often very limited. The fishery also makes an important economic contribution in some homes in the small communities and on reserves by providing food for people with limited incomes. For many of the larger number of residents in Ontario who are employed in other sectors of the economy, angling provides a recreational opportunity not readily available in comparable quality in most other parts of Canada and makes a significant contribution to the quality of life in the Lake of the Woods area.

4. Users of the Fishery

a. Commercial Fishermen

The following two groups are recognized under this category.

- Indian Fishermen - includes Treaty Indians living in Ontario on reserves fishing for commercial and domestic purposes under the authority of a commercial fishing licence.
- Non-Indian Fishermen - all other commercial fishermen.

b. Anglers

The following groups are included within this category:

- Resident (local) Anglers - Ontario residents living in the immediate study area and fishing in their own jurisdiction. (All Ontario resident anglers are considered locals.)
- Non-Resident/Non-Local Resort Guests - anglers using local commercial tourist accommodation operations including lodges, campgrounds and houseboats.
- Non-Resident Property Owners - anglers based at cottages owned by non-residents of the local area.
- Non-Resident (Non-Local) Campers - includes Lake of the Woods anglers who live outside the jurisdiction being fished and who camp on public or Crown land including two Ontario Provincial Parks (Lake of the Woods and Sioux Narrows Parks).
- Minnesota Based Boater Anglers - includes fishermen based in Minnesota and fishing in Ontario waters on a day-use basis.

5. User Profiles

a. Indian Commercial Fishermen

The Indian commercial fishery in Ontario has grown significantly in the last 40 years. All bands on Lake of the Woods fish commercially but one, the Washagamis Bay Band. Most of the Indian fisheries are recognized as band fisheries. Most licenses are characteristically fished by many families with a full range of age and experience. For management purposes, there are 44 commercial lots

in the Ontario portion of the lake and 15 are licensed to Indians. There are 10 commercial fishing operations in the South Sector, two in the Regina - Long Bay area of the Central Sector, one in the North Sector, and two on Shoal Lake.

While most effort is expended on fishing for commercial sale rather than for domestic purposes, fishing for personal consumption in Ontario also occurs through a commercial fishing license. There is a historic significance of fishing as a basis for sustenance and social organization for the Indian people which is still valid today.

The economic value of the domestic harvest is included in the commercial fish category, while harvest data from this source is displayed as part of the resident fishery in the fisheries information section.

b. Non-Indian Commercial Fishermen

Of the 44 commercial lots on the lake in Ontario, 29 are licensed to 24 non-Indian commercial operators. Within the Central Sector there are four non-Indian commercial operators, 13 in the South Sector, 5 in the North Sector, and 2 on Shoal Lake. Sectors 3 and 4 (Whitefish and Sabaskong Bays) are closed to commercial fishing.

Most non-Indian fishing operations are carried out by an individual or family group, in some cases with assistance from friends, relatives or from hired fishermen. Fishing

activity for all commercial fishermen is concentrated in the fall and to a lesser extent in May/June. Few fish in the winter to any extent. Most commercial fishing is done by gill netting.

c. Resident Anglers

In about three-quarters of local households in Ontario, at least one person fishes on Lake of the Woods once or more per year, making angling a very important recreational activity. Of the estimated 3,000 cottage lots on Lake of the Woods in Ontario, some 740 are owned by local residents.

The North Sector which is closest to the Kenora - Keewatin population centre is the most heavily fished area by local Ontario residents (35% of total). The Central Sector is the second most frequently fished area on Lake of the Woods by this group (17% of total). Comparatively little angling activity occurs in the South Sectors (8%), Whitefish (11%) and Sabaskong Bays (7% of total use) by local residents of Ontario.

d. Non-Resident/Non-Local Resort Guests

There are 107 tourist accommodation operations in Ontario dependent on fishing Lake of the Woods. (These are operations which obtain more than 25% of their gross revenue from angling activity on the lake.) Main base, outpost camp, campground and houseboat accommodations are offered by these operations. Approximately 80% of all guests are anglers who fish primarily on Lake of the Woods. About 90% of these are from the midwestern United States, and most of the rest are from Manitoba.

American visitors are more predominant in the south and eastern part of the lake while Canadian non-residents of Ontario (Manitobans primarily) tend to stay in the northern sectors.

Estimates of the occupancy rates for these establishments are 63% (Table 2).

Figure 11 shows the origin of tourist angling in each of the study sectors based on 1980 questionnaire data and recent creel surveys in 1983 and 1985.

The North Sector tourist fishery receives all of its use from guests staying at resorts within this area or located nearby, off of the lake.

The majority of tourist anglers in Whitefish and Sabaskong Bays are based within each sector. About 16% and 35% of the tourist fisheries in Whitefish and Sabaskong Bays, respectively, are from other nearby Ontario sectors. Less than 2% of all tourist guests in these areas are based in Minnesota.

Eighty-five percent of tourist guests who fish in the Central Sector are lodged in other Ontario sectors; 13% stay within the Central Sector itself while 2% originate from Minnesota resorts.

The Southern Sector tourist fishery draws 35% of its anglers from the sector itself, 20% from other Ontario sectors, and 45% from Minnesota bases of accommodation.

LAKE OF THE WOODS

ANGLER GUEST DAYS* BY SECTOR OF ORIGIN

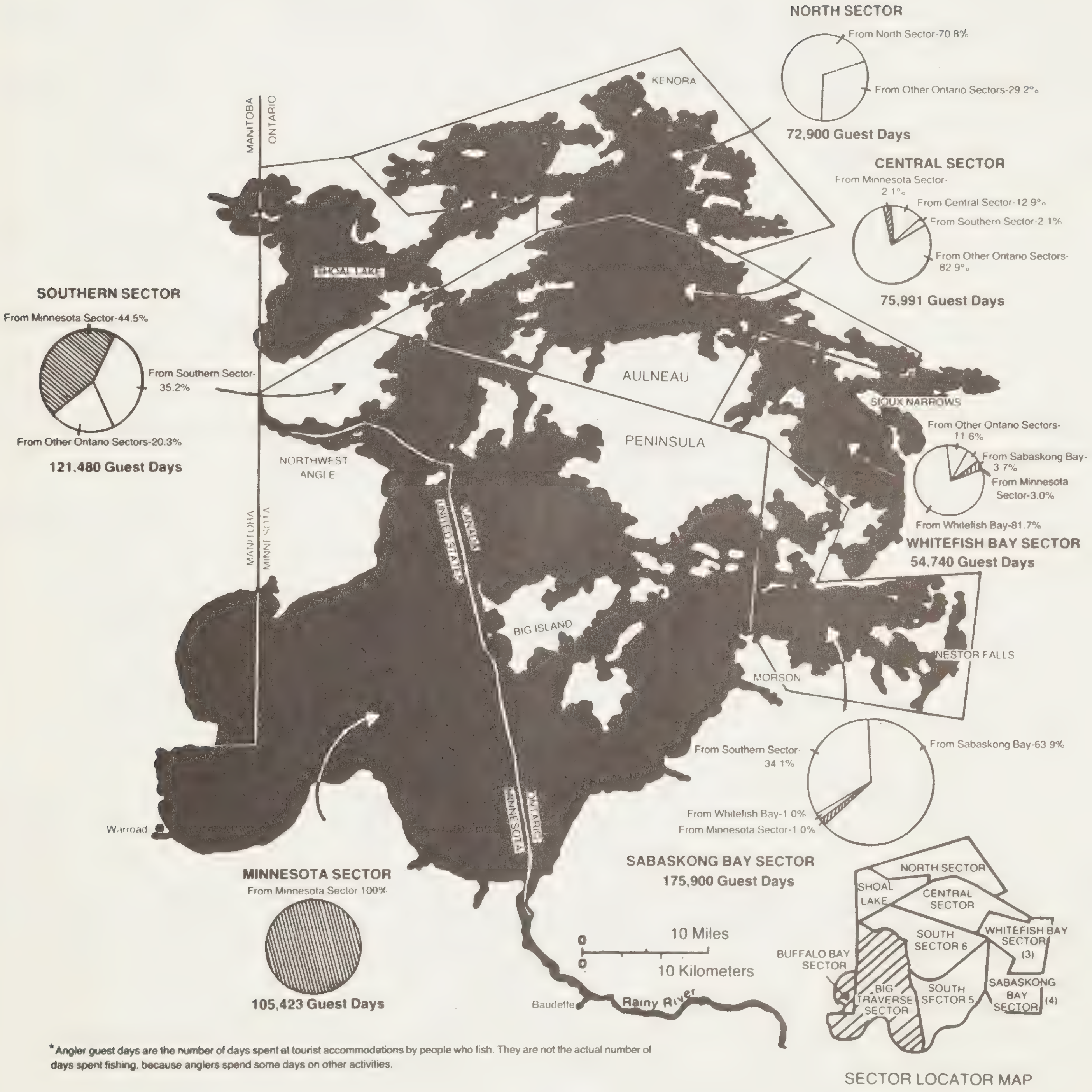

FIGURE 11

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*Angler guest days are the number of days spent at tourist accommodations by people who fish. They are not the actual number of days spent fishing, because anglers spend some days on other activities.

Table 2. Private tourist accommodation by sector for Ontario resorts.

SECTOR		NUMBER OF OPERATIONS	TOTAL GUEST CAPACITY	AVG. SEASON OCCUPANCY*	PERCENT OF GUESTS ANGLIN
1	(NORTH)	10 camping 3 houseboats 2	927 campground 626	55%	86%
2	(CENTRAL)	4 camping 2	278 campgrounds 99	63%	71%
3	(WHITEFISH) (BAY)	27 camping 4 houseboats 2	1,633 campgrounds 425	60%	87%
4	(SABASKONG) (BAY)	24 camping 6 houseboats 2	1,560 campgrounds 626	71%	91%
5 & 6	(SOUTH)	18 camping 6	930 campgrounds 272	63%	91%
	OFF LAKE (Northern)	11 camping 6	703 campgrounds 354	52%	80%
	OFF LAKE (Southern)	13 camping 7	1,040 campgrounds 391	64%	93%
TOTAL		107	7,071		

*Average season occupancy is for indoor lodging facilities.

e. Non-Resident Property Owners

Cottage-based angling is an important component of the recreational fishery on Lake of the Woods. About 2,230 Ontario cottage lots on the lake (about 60% of total) are owned by persons not living in the Lake of the Woods area and 84% of these households fish. Manitobans account for the majority of non-resident property owners, especially on Shoal Lake and the North Sector, and Americans for most of the rest.

Based on the 1983 Ontario creel survey (Mosindy 1984), non-resident property owners represented 19% of the total angling effort in the North Sector, 18% in the Central, 13% in Whitefish Bay, 9% in Sabaskong, and approximately 6% in the South Sectors (Figure 12).

f. Non-Resident Campers

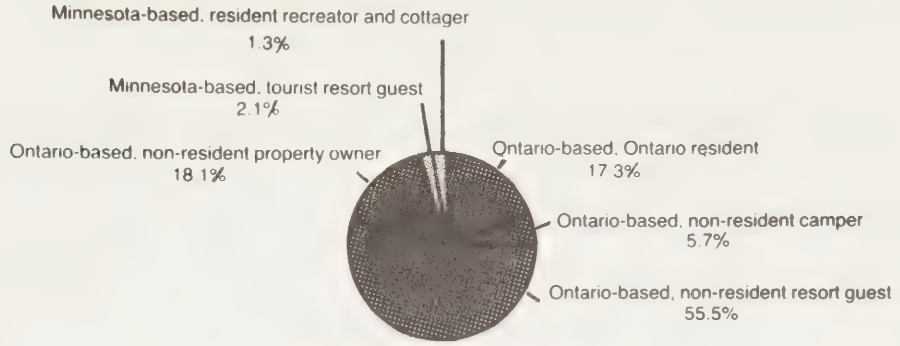
The 1983 Ontario creel survey shows that 6% of the total angling effort in the Central Sector is attributable to non-resident campers based in Ontario, 8% of the effort in Whitefish Bay, 2% of the effort in Sabaskong Bay and approximately 5% of the effort in the South Sectors (Figure 12).

g. Minnesota Based Boater Anglers

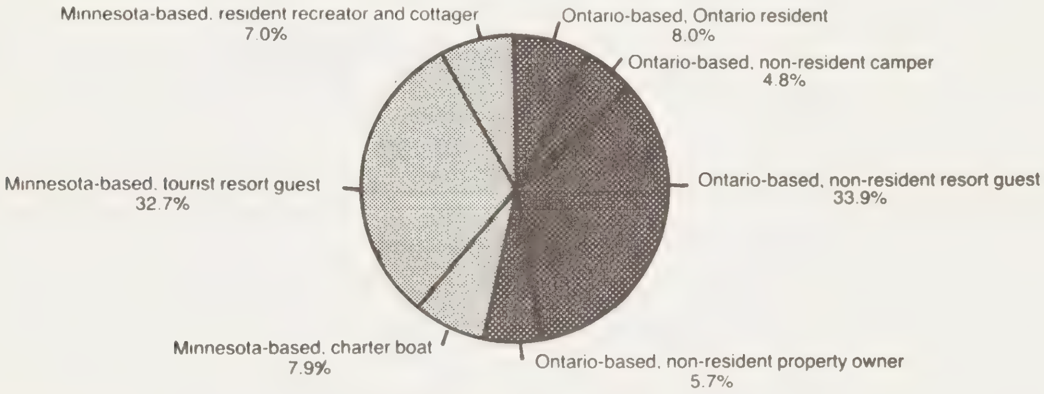
The use of Ontario's portion of Lake of the Woods by U.S. based charter boats, houseboats and smaller boats owned by both local planning area residents and tourist resort guests is an important component of the recreational fishery. The relative use of Minnesota and Manitoba waters by residents of Ontario is small.

LAKE OF THE WOODS

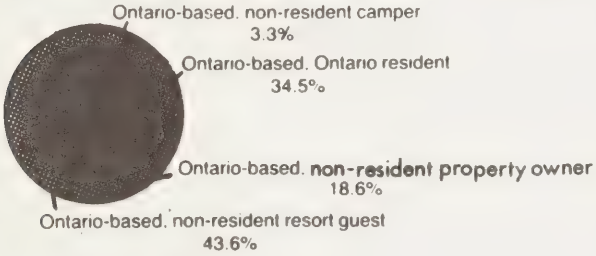
FISHING EFFORT BY USER GROUP IN ONTARIO SECTORS



CENTRAL SECTOR (Sector 2)
123,496 Manhours of Effort

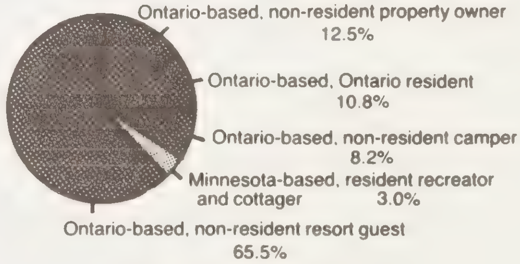


SOUTHERN SECTOR (Sectors 5 & 6)
315,863 Manhours of Effort

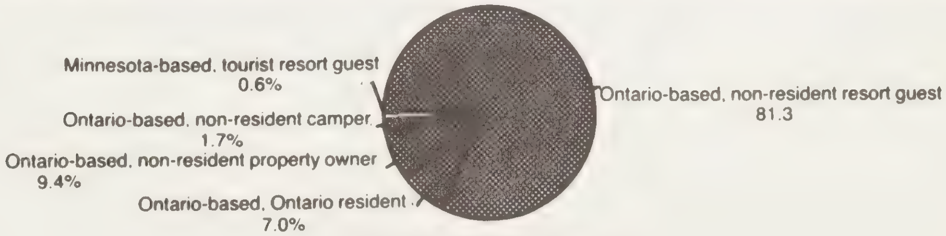


NORTH SECTOR* (Sector 1)
79,272 Manhours of Effort

* percentage composition by user-group based on both 1983 and 1984 surveys.



WHITEFISH BAY (Sector 3)
125,060 Manhours of Effort



SABASKONG BAY (Sector 4)
200,132 Manhours of Effort

FIGURE 12

Overall, angling in Ontario waters from Minnesota bases of operation accounted for approximately 3% of the 1983 total angling effort in the Central Sector and a more significant 48% in the South Sectors (Figure 12). Minnesota based angling effort in Whitefish and Sabaskong Bays represents 3% and 1% of total annual effort in these sectors, respectively. The majority of this occurs during the winter season.

B. Estimate of Socio-Economic Benefits

1. Economic Analysis

In this analysis the measure of revenue used is restricted to "gross operation revenue" which refers to the total revenues accruing to operations before any costs are considered. Estimates of revenues are limited to direct revenues with no attempt to reflect secondary activity or multipliers. All economic data are estimated on an annual basis and standardized to 1983 Canadian dollars where possible.

Table 3 summarizes the direct economic returns and benefits of the Lake of the Woods fishery to the various user groups. Overall, the fishery generated about $10.5 million in gross operation revenues in the local area of Ontario. The use of the fishery by non-resident Ontario resort guests accounts for some 85% of the gross economic returns from the Lake of the Woods fishery in Ontario, commercial fishing 7% and other uses 8%.

The 1983 Lake of the Woods commercial fish harvest in Ontario has an estimated dockside value of $548,000 based on the 1984 quotas for walleye, northern pike, crappie, whitefish and sturgeon. In addition, the fish taken by native people under commercial fish licenses for domestic use is estimated to have a value of $150,000. The Central and South Sectors combined have quotas that represent 82% of the total value of the Ontario Lake of the Woods commercial fishery. The North Sector and Shoal Lake account for the remaining 18%.

The destinations of the income generated by tourists fishing in the study area are shown in Figure 13. Ontario receives 59% of the economic benefits from tourist angling in the South Sectors, 98% of the benefits in the Central Sector, and almost all of the economic benefits from tourists angling in the North Sector, Shoal Lake, Whitefish and Sabaskong Bays. Minnesota received 40% ($1.2 million) of the Ontario South Sector benefits.

No attempt to identify direct economic returns by sector for the remaining users of the fishery in Ontario (8% of total Ontario gross economic return) has been made due to a lack of accurate data.

2. Social Analysis

Social benefits are difficult to translate into dollars but are of importance to local community welfare. They include number and type of jobs created and recreational opportunities provided by the Lake of the Woods fishery.

LAKE OF THE WOODS

SECTOR RECEIVING DIRECT REVENUE FROM TOURIST ANGLERS*

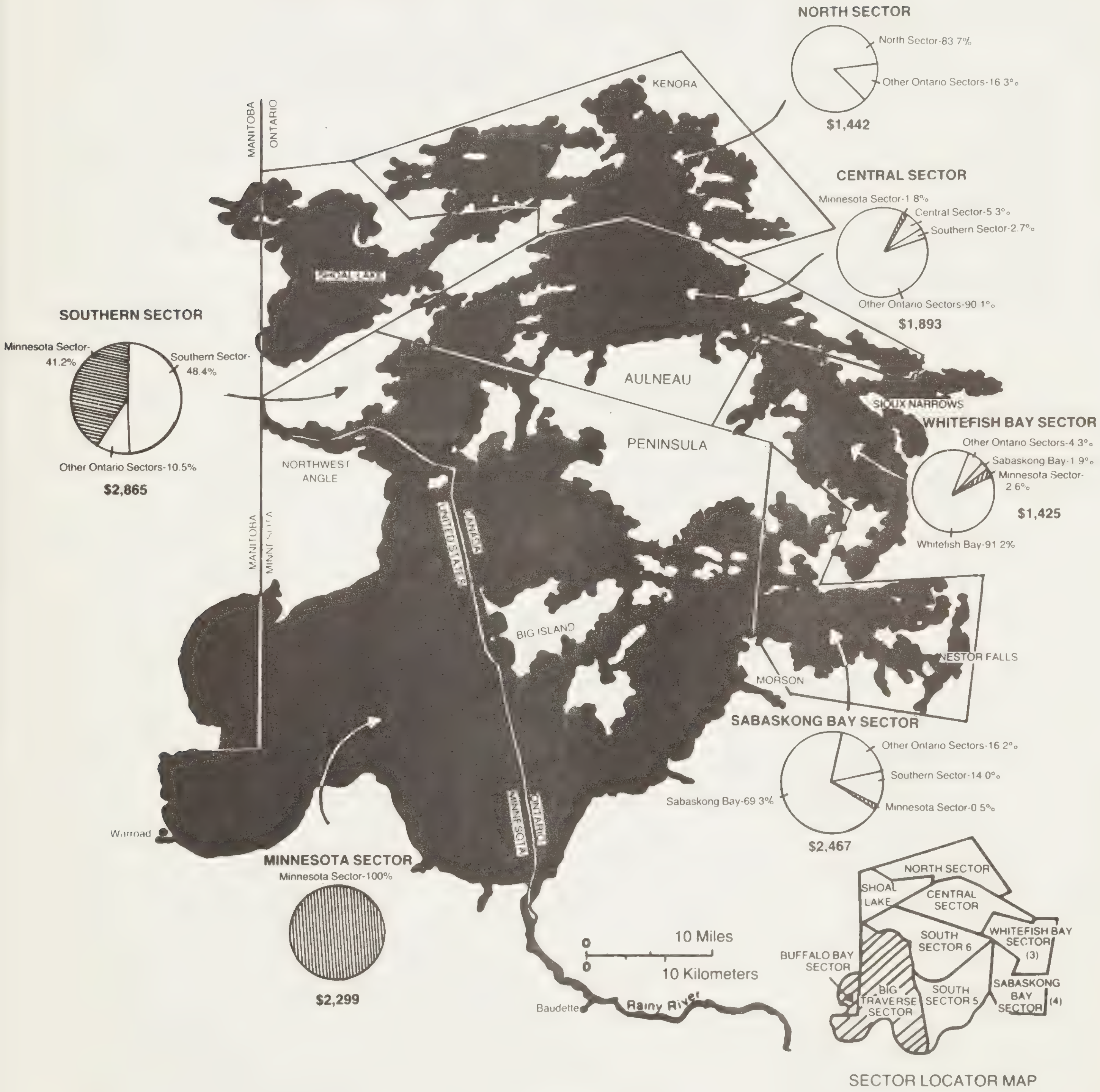


FIGURE 13

* Revenue measured in thousands of Canadian dollars

Table 3. Gross operation revenues generated locally by user group, Lake of the Woods, Ontario.

		Ontario
1. Commercial Fishermen (a)	$	698,000
2. Local Anglers		452,000
3. Non-Resident Resort Guests: tourist accommodation operations		8,861,000
4. Non-Resident Campers		66,000
5. Non-Resident Property Owners		408,000
TOTAL	$	10,485,000

(a) Value based on 1984 quotas; includes Indian domestic harvest valued at $150,000.

The fishery creates over 700 jobs in the local area but many are seasonal. Often people employed in a fisheries - related job have another line of employment, elsewhere.

Job opportunities for native people in Ontario are most important, especially in terms of commercial fishing and guiding. Of 221 people involved in commercial fishing in Ontario, 159 are Indian. Similarly, in addition to the 435 people employed in Ontario tourist accommodation operations, there are approximately 160 Indian people who guide fishing parties to some extent during the season.

Ontario receives 98% of the employment benefits from tourist angling in the Central Sector, 50% of the benefits in the South Sectors, and virtually all of the benefits from angling in the other sectors.

Minnesota recovered 50% of the employment benefits from fishing in the Ontario South Sectors.

3. Future Demands on the Fishery:

a. Commercial Fishing

The long term trend in the Ontario commercial fishery has been towards fewer fishermen and reduced harvests. However, requests for quota increases from both native and non-native commercial fishermen continue to increase as the total number of individual fishermen decreases. The long term need to accommodate employment and domestic needs of native communities is recognized as high priority, but not necessarily from the fishery.

b. Angling

In Ontario waters, a 20% increase in angler demand is anticipated by the year 2000 based on traditional growth of non-resident fishing in northwestern Ontario.

Of concern, however, are the present occupancy rates within the commercial tourist sector relative to their capacity to accommodate guests. Future growth of tourist clientele will depend heavily on the ability of the fishery to provide a high quality fishing experience, particularly for walleye.

It is anticipated that demand by local Ontario residents will continue, much the same as it has till now, since no major population changes are anticipated.The use of the fishery by non-resident property owners will increase in proportion to cottage growth. This could be significant if the many Indian bands on the lake which have good developable property become cottage developers. At least three Indian reserves to date have actively pursued this possibility.

The Lake of the Woods area is expected to retain its status as an important angling locale for the foreseeable future.

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Addendum 1: Creel survey, 1985

A lake-wide creel survey was conducted on Sectors 1, 2, 3, 4, 5 and 6 of Lake of the Woods from May 18 to September 30, 1985. This survey was primarily designed to assess the effects of new regulations, including those introduced under the Crown Land Recreation Pilot Program (1984), on angling effort and harvest, visitor type, and residency of anglers within Ontario waters of Lake of the Woods which border with Minnesota. Besides a provincial increase in the basic non-resident angling licence and the requirement for non-residents to purchase specific permits to fish for muskellunge and lake trout (1984), new regulations also required non-residents wishing to camp on Crown land to pay a daily user fee and restricted Crown land camping by non-residents in specified areas. A Border Waters Angling Validation Tag which was introduced in 1985 required non-resident anglers based in the U.S.A. to purchase a day user validation tag to fish in Ontario waters of Lake of the woods, Rainy River and Rainy Lake.

These regulations appear to have influenced patterns of angling effort and harvest by certain user groups and within specific sectors. The 1985 survey indicated an increase in both effort (man-hours) and harvest (kg) for most sectors when compared to results from the 1983 survey (Appendix 1). Angling effort increased by 200%, 130% and 24%, 42% and 18% in Sectors 1, 2, 3, 4 and 6, respectively, but declined by about 6% in Sector 5 which is closest to American population centres. Total effort, exerted by resident and non-resident anglers who were based in Ontario, increased by 110% and 37%, respectively (Appendix 2). Overall effort by non-resident Minnesota based anglers decreased by 54% over 1983 levels, primarily due to a 70% decrease in effort by non-resident anglers who fished in Sector 5. Use of Ontario waters by resort and charter boat guests based in Minnesota decreased by 70% and 50%, respectively.

Both total angling effort and harvest for 1985 are comparable to estimates in this atlas which represent the average of totals derived from creel surveys in 1977 and 1983 (Appendix 1). Total angling effort and harvest were estimated at 1,273,193 manhours and 249,874 kg in 1985 as compared to 1,100,830 manhours and 294,650 kg from the average of 1977 and 1983 survey values.

Appendix 1: A comparison of effort and harvest estimates for angling during the period May - September, 1977, 1983, 1985, Lake of the Woods, Ontario.

	ANGLING EFFORT (MAN HRS)			ANGLING HARVEST (KG)					
				ALL SPECIES			WALLEYE		
Sector	1985	1983	1977	1985	1983	1977	1985	1983	1977
1	236,857	79,272	262,997	45,955	20,308	74,050	24,741	13,261	54,797
2	281,016	123,496	262,997	57,781	30,409	74,050	28,925	19,857	54,797
3	155,054	125,060	201,786	30,021	30,266	57,474	16,272	19,893	11,020
4	283,791	200,132	248,387	55,111	48,985	69,936	34,222	31,909	50,050
5	217,273	230,894	201,540	41,706	55,485	54,033	23,183	36,232	39,984
6	99,202	83,986	181,130	19,300	19,779	54,552	10,586	12,915	40,368
TOTAL	1,273,193	842,840	1,358,837	249,874	205,232	384,095	137,929	134,067	251,016

Appendix 2: A comparison of angling effort (man-hours) by user-group and base of operations for Lake of the Woods, Ontario, May - September 1983, 1984 and 1985.

Sector/ Year		Resident					NON - RESIDENT									
							Canadian Base						American Base			
		Home/ Cottager Guide	Camper Prov.	Camper Crown	Resort guest Guided	Resort guest Non-guided	Private Cottage	Camper Prov.	Camper Crown	Resort Guest Guided	Resort Guest Non-guided	House-boat	Resort guest Guided	Resort guest Non-guided	Day user/ cottager	Charter Boat
1	1983	15282	-	-	-	-	15282	-	-	1908	46800	-	-	-	-	-
	1985	77452	-	-	-	-	59451	-	-	9474	85270	2605	-	-	2605	-
2	1983	19801	260	-	-	1303	22407	2344	4690	11463	51587	5471	-	2605	1565	-
	1985	59294	-	1405	1124	562	56765	-	5901	50864	81214	13489	-	2248	8150	-
3	1983	9390	875	750	500	1125	15883	1376	9255	12631	70787	2501	-	-	-	-
	1985	8218	775	-	620	620	31475	7753	3721	9770	87760	4342	-	-	-	-
4	1983	11208	-	800	-	2000	18812	-	3402	12608	150100	-	-	1202	-	-
	1985	14475	-	-	-	2270	37460	2270	12203	17595	195248	1420	-	-	850	-
5	1983	15905	4936	-	548	-	17000	6307	6856	14260	63895	4387	1373	58957	17275	19195
	1985	9560	1738	-	-	1086	46062	3042	5866	13470	99295	7605	-	14122	2825	12602
6	1983	3631	-	-	-	242	968	-	1937	6777	16216	1453	11411	30702	4840	5809
	1985	6944	-	-	-	-	5456	-	2480	29165	25693	993	1488	13790	13193	-
ALL SECTORS																
	1983	75207	6071	1550	1048	4670	90352	10027	26140	59647	399382	13812	12784	93466	23680	25004
	1985	175943	2513	1405	1744	4538	236669	13065	30171	130338	574480	30454	1488	30160	27623	12602

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